CBSE Test Paper-01

Chapter 11 Human Eye and the Colourful World

1. A person cannot see distinctly any object placed beyond 40cm from his eyes. Calculate the power of the lens which will help him to see distant objects clearly. **(1)**

   a. -2.5 Dioptre
   b. -1.5 Dioptre
   c. +2 Dioptre
   d. +1 Dioptre

2. The inability among the elderly to see nearby objects clearly because of the weaking of the ciliary muscles is called- **(1)**

   a. Presbyopia
   b. Far sightedness
   c. Myopia
   d. Near-sightedness

3. The colour that is scattered the least by the tiny particles and the atoms/ molecules of the atmosphere is **(1)**

   a. Red
   b. Green
   c. Violet
   d. yellow

4. Cone cells helps us to see- **(1)**

   A. In dark
   B. In daytime
   C. Colours
   D. None

   a. A and C
   b. All of these

    c. B and C

    d. A and B

5. Which of the following phenomenon contributes significantly to the reddish appearance of the sun at sunrise or sunset? **(1)**

    a. Total internal Reflection

    b. Dispersion of light

    c. Reflection of light from the earth

    d. Scattering of light

6. Colour of eye depends upon colour of which part of eye ? **(1)**

7. Name the part of an eye which is equivalent to following parts in a camera. **(1)**

    i. diaphragm

    ii. photographic plate

8. What would have been the colour of the sky, if the Earth had no atmosphere? **(1)**

9. Define power of accommodation? **(1)**

10. What is Tyndall effect? Explain with an example. **(3)**

11. Why do we observe difference in colours of the Sun during sunrise, sunset and noon? **(3)**

12. State one main function each of iris, pupil, and cornea. **(3)**

13. What part of the eye can be denoted after death ? **(3)**

14.   i. Demonstrate an activity with a well labelled diagram to prove that white light is made up of seven colours.

    ii. Which colour of light bends least and which one the most while passing out from the prism? Also, state the reason for the same. **(5)**

15. What are rods and cones ? Give their action. **(5)**

Answers

1. a. -2.5 Dioptre

   Explanation: $\frac{1}{f} = \frac{1}{v} - \frac{1}{u}$

   $v = -40\ cm,\ u = \infty$

   $\frac{1}{f} = \frac{1}{-40} - \frac{1}{\infty}$

   $\frac{1}{f} = \frac{-1}{40} - 0$

   $\frac{1}{f} = \frac{-1}{40}$

   $f = -40\ cm$

   $P = \frac{100}{f} = \frac{100}{-40} = -2.5\text{D}$

2. a. Presbyopia

   Explanation: As we become old, the power of accommodation of the eye usually decreases, the near point gradually recedes away. This defect is called Presbyopia. Person may suffer from both myopia and hypermetropia.

   Correction- Using of Bifocal lens with appropriate power. Bifocal lenses consist of both concave and convex lens, upper position consist of concave lens and lower portion consist of convex lens.

3. a. Red

   Explanation: Scattering of light decreases with increase in wavelength. Red colour scattered the least when strikes the small particle of fog and smoke because it has the maximum wavelength (visible spectrum).

4. c. B and C

   Explanation: The photoreceptor cells in the retina are of two types, viz. rod cells and cone cells. The rod cells are sensitive to dim light whereas the cone cells are sensitive to bright light (daytime) and colour.

5. d. Scattering of light

   Explanation: While sunset and sunrise, the colour of the sun and its surrounding appear red. During sunset and sunrise, the sun is near horizon,

and therefore the sunlight has to travel larger distance in atmosphere. Due to this most of the blue light (shorter wavelength) are scattered away by the particles. The light of longer wavelength (red colour) will reach our eye. This is why sun appear red in colour.

6. Colour of eye is depends upon the colour of iris.

7. i. Iris of an eye = diaphragm in a camera.

   ii. Retina of an eye = photographic plate in a camera.

8. If the earth has no atmosphere, the sky would have appeared black because of no refraction.

9. The ability of the eye to focus objects lying at different distances clearly on the retina by changing the focal length of the eye lens with the help of ciliary muscles is called the power of accommodation of the eye.

10. The scattering of the light by particles, that it encounters in its path, is called Tyndall effect. When a beam of light enters a smoke-filled dark room through a small hole, then its path becomes visible to us. The tiny dust particles present in the air of room scatter the beam of light all around the room. Thus, scattering of light makes the particles visible. Tyndall effect can also be observed when sunlight passes through a canopy of a dense forest, where, the tiny water droplets in the mist scatter the light.

11. This is because of scattering of light near the horizon, most of the blue light and shorter wavelengths are scattered away by the particles present in the atmosphere during sunrise and sunset. So, the light that reaches our eyes is of longer wavelength (e.g. red). This gives rise to the reddish appearance of the sky. But during the day sun appears white as sun is near the surface of earth nearly overhead, thus the sunlight passes through much smaller distance and thus the scattering is much less and sun appears white.

12. Function of

   i. Iris controls the size of pupil thus, monitoring the amount of light rays entering through pupil.

   ii. Pupil is the aperture through which light enters and reach retina.c

   iii. Cornea provides 67% of of eye's focussing power.

13. The cornea from dead body is removed within 6 hours of the death and transplanted in the eyes of blind person with opaque cornea. His opaque cornea is replaced by transparent cornea of dead person.

14. i. The phenomenon of splitting of a beam of white light into its seven constituent colours when passed through a transparent medium is known as dispersion, which was first discovered by Issac Newton in 1666. To understand this phenomenon, let us take a thick sheet of cardboard and make a small hole or narrow slit in its middle allow sunlight to fall on the slit. This gives a narrow beam of white light. Now, take a glass prism and allow this white light to fall one of its faces as shown in figure. Turn the prism slowly until the light that comes out of it appears on a nearby screen.

   We see a beautiful band of seven colours on the screen called visible spectrum. The sequence of colours seen from the lower part of the screen is violet (V), indigo (I), blue (B), green (G), yellow (Y), orange (O) and red (R). The acronym for this is VIBGYOR.

   ii.
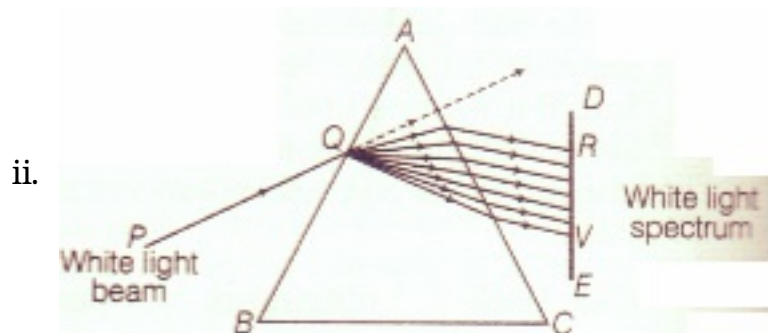
   Red light has the maximum wavelength and violet light has the minimum wavelength, so in a transparent medium except air and vacuum, red light having the largest wavelength suffers the least deviation while violet light having the least wavelength bends the most.

   As wavelength $\infty \dfrac{1}{deviation\ (or\ bending)}$

15. Sensitive portion of retina has large number of cells; one rod shaped and other cones shaped.Rod shaped cells are sensitive to the intensity or brightness of the light whereas cone shaped cells are sensitive to colours. Different animals have different type of cells. Bee has certain cone shaped cells which are sensitive to light beyond violet. This part of spectrum beyond violet called ultra violet region can be seen by bee whereas human being cannot see ultra-violet region. Chickens have very few rod shaped cells and hence their eyes are not able to see less bright light. Hence they stroll only in bright light. They come late in the morning and go back earlier in the evening. Most of its cells are cone shaped and hence are very sensitive to colours.